Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Utilizing Rapidly Deployable Aerial Communications Architecture in Response to an Emergency	)	PS Docket No. 11-15

COMMENTS OF
THE UNMANNED AVIATION PUBLIC SAFETY ASSOCIATION

The Unmanned Aviation Public Safety Association (UAPSA) submits these Comments in response to the Commission Notice of Inquiry (NOI) in the above-captioned proceeding.[1] In these comments UAPSA encourages the Commission to work with the public, private, and non-profit organizations in the wildland firefighting community to advance the development of rapidly deployable aerial communications architecture (DACA) and the associated coordination of operations, spectrum, and authorization matters. Wildland firefighting organizations understand the scope and performance of rapidly deployable operable and interoperable communications across a broad range of interagency responses and incident magnitudes. These organizations currently address a number of the issues identified in the DACA NOI, including the coordination of air-ground operations, interagency communications management, and public safety communications training and readiness. As wildland firefighting organizations explore the development and deployment of DACA technology, they will also provide an important opportunity to exercise day-to-day usage as outlined in the public safety communications interoperability continuum. Day-to-day DACA usage for wildland firefighting that exercises all performance features can provide an important capacity and knowledge base for successfully using DACA to support large scale disaster response. By partnering with wildland firefighters to develop DACA, the FCC would gain the opportunity to work with a highly motivated, mission-oriented, and technologically-savvy interagency community that understands the need to develop, test and deploy new technology under controlled circumstances.

[1] Notice of Inquiry: Utilizing Rapidly Deployable Aerial Communications Architecture in Response to an Emergency, FCC 12-53, released May 24, 2012.

The Unmanned Aviation Public Safety Association

The nonprofit Unmanned Aviation Public Safety Association (UAPSA) has a two-fold mission:

- Promote the safe, orderly, and effective adoption of Unmanned Aircraft Systems (UAS) technology by law enforcement, homeland security, fire, emergency medical, and emergency management and response practitioners and agencies at all levels of local, state, provincial, tribal and Federal government (collectively referred to as public safety (PS)).
- Educate and train PS practitioners and management regarding the safe and orderly integration of UAS into PS operations and the National Airspace System (NAS).

While UAPSA's mission focuses on public safety agencies and practitioners, the Association is based on a public-private partnership model that requires UAPSA to benefit the entire UAS community. This community consists of stakeholders in the public, private, and non-profit sectors that want to achieve the safe and orderly adoption of UAS technology into the National Airspace System.

UAPSA Comments

To effectively respond to wildland fires, and to maintain the highest safety levels, wildland fire managers need to deploy robust and flexible fireline communications and decision support technologies. Increased wildland fire activity and longer fire seasons have resulted in higher operational tempos, and the usage rates for capital equipment and aviation resources have likewise risen. Intense demands placed on aging and outdated capital assets have underscored the requirement to replace this equipment - particularly aviation assets, and to bring new capabilities online. Research and development conducted by the wildland fire community has demonstrated the substantial potential that unmanned aircraft systems (UAS), including rapidly deployable aerial communications architecture (DACA), can provide to increase situational awareness and reduce the risks for human pilots and operators, and to address critical communications operability and interoperability shortfalls on the fireline. The wildland fire community also has a long history of interagency cooperation and organizational structures in

place to coordinate before, during, and after major events in areas that are key to DACA development and implementation, including interagency coordination among local, state and Federal agencies in the following areas:

- Interoperable communications and frequency coordination
- National Airspace System (NAS) coordination
- Implementation and refinement of the National Interagency Incident Management System (NIIM)
- Research, development and public-private partnerships to address science and technology needs

UAPSA respectfully recommends that the Federal Communications Commission's, Public Safety and Homeland Security Bureau (FCC PSHSB) work with the wildland fire community as the PSHSB seeks to advance the development and scope of DACA use, and to understand how best to coordinate operations, spectrum, and authorization matters. In return, the FCC would gain the opportunity to work with a highly motivated, mission-oriented, and technologically-savvy interagency community that understands the need to develop, test and deploy new technology under controlled circumstances.

Wildland Fire Technology Needs and DACA

New technology and different approaches to situational awareness such as UAS and DACA that reduce human flight time and exposure to hazards will improve the effectiveness and efficiency of wildland fire operations while greatly reducing the risk to pilots, operators, communications technicians, and responders. Wildland fire suppression has begun a transformation process that over the next decade will be driven by technology, requirements for greater mobility and agility, and suppression strategies that will demand new levels of flexibility and precision. Major shifts in technology investment will include acquiring modern air assets, improving monitoring and surveillance capabilities, creating a new generation of decision support tools, and developing more complete and effective communication linkages including air-to-ground, unit-to-unit, and engine-to-engine. These new intelligence and decision support systems will use real-time information collected from UAS and other airborne platforms. UAS have proven value in fire detection, perimeter mapping, fire behavior assessment and command-

and-control (C2) operations reducing both risk and cost. Utilization of UAS for fire monitoring can also reduce human exposure and flight time in smoke and low visibility situations. Equipping manned and unmanned airborne platforms with DACA capabilities will maximize the taxpayers' return on their investment in them and platform flexibility for use in multiple roles as required.

Human aiding technology based on military C2, communications, computer, and intelligence, surveillance and reconnaissance (C4ISR) concepts can be applied to wildland firefighting activities such as resource ordering, mapping, radio frequency management, weather forecasting, and increasing the efficiency of aviation asset utilization by requesting Temporary Flight Restrictions (TFR) using real time up-links to and from aircraft. Military C4ISR concepts of operation (CONOPS) are compatible with existing wildland firefighters' missions and activities and are similar to DACA CONOPS. This mission set includes large fire initial attack and support, fire use monitoring, C2 of aerial and other resources, and national airspace coordination. Military, wildland firefighting, and DACA CONOPS all assume lack of existing infrastructure, and are designed to meet requirements for situational awareness, C2, operable and interoperable communications, and airspace coordination.

As observed in the Notice of Inquiry, the United States Armed Forces use DACA technologies successfully in theater to provide communications in the absence of available infrastructure. When wildland fires occur in areas with limited communications infrastructure and operability, standard procedures call for deploying ground-based repeaters. Because of difficulties in deploying these repeaters, the risks to personnel and equipment in deployment, and inadequate coverage that these repeaters may provide, wildland firefighting could substantially benefit from leveraging both FCC and military lessons-learned and investments in DACA technologies, and tactics, techniques and procedures (TTP). In areas that may have more communications infrastructure coverage, such as the wildland urban interface, DACA could be used to address gaps in interoperability among Federal, state, local and tribal agencies and fire departments who are responding with a mixture of equipment, training, and skill sets.

Wildland Fire DACA Usage and Coordination Capabilities

In considering the coordination of civil and government use of DACA technologies, an example of a current wildland and urban firefighting communications concern will help illustrate the challenges. Firefighters are grappling with the problem of enforcing radio discipline in the use of land mobile radios (LMR).[2] For a new generation of firefighters that is used to ubiquitous cell and text communications, problems associated with the increasing availability of LMR handsets and limited channel capacity are life-threatening. At the same time the wildland fire community has already seen benefits from the proliferation of personal devices connected through commercial networks.[3] Questions regarding capacity, volume and value of communications, and the mix of mission-critical public safety and commercial communications capabilities mirrors essential questions raised in the FCC Notice of Inquiry (NOI). The employment of DACA technology in support of wildland firefighting can potentially extend and support the reach of both types of communications technologies, and the wildland firefighting community would need to exercise its demonstrated capabilities for managing fireline communications to realize this potential. The issues that the wildland firefighting community will face in addressing these challenges, as well as in deploying DACA technology also anticipate the challenges faced in the buildout and migration to a nationwide public safety broadband network. For the wildland firefighting community, these challenges must be addressed in one of public safety's most hostile and mission-critical communications environments.

Governance of wildland fire technology needs, architectures, development, and deployment has evolved to meet these challenges. Historically-cooperative, interagency wildland fire organizations such as the Wildland Fire Leadership Council (WFLC),[4] National Wildfire Coordination Group (NWCG),[5] and the National Multi-Agency Coordinating Group (NMAC)[6] are working to accommodate rapidly changing technology through activities such as the Wildland Fire Enterprise Architecture (WFEA),[7] Mobile Technology Integration into Fire

[2] See http://www.blm.gov/nifc/st/en/prog/fire/training/fire_training/projects/radio_communication.html
[3] See http://www.conservationgateway.org/file/usfs-mtifam-mobile-strategies-recommendations
[4] See http://www.forestsandrangelands.gov/leadership/
[5] See http://www.nwcg.gov/
[6] See http://www.nifc.gov/nicc/administrative/nmac/index.html
[7] See http://www.nwcg.gov/nwfea/

and Aviation Mangement (MITIFAM),[8] and other coordinated strategic planning activities. Leading edge research and development in wildland fire C4ISR technologies such as UAS systems, airborne sensors and communications systems, geospatial modeling, and other technologies and TTPs is being conducted and coordinated among organizations with wildland fire responsibilities such as the U.S. Forest Service (USFS), the Bureaus of Land Management and Indian Affairs, U.S. Fish and Wildlife Service, NOAA, NASA, USGS, U.S. Fire Administration, and the National Association of Foresters, through programs such as the USFS Remote Sensing Applications Center (RSAC, See Figure 1),[9] the Wildland Fire Science Partnership (WFSP),[10] the Wildland Fire Management Research Development and Application (WFMRDA),[11] and the Tactical Fire Remote Sensing Advisory Committee (TFRSAC).[12]

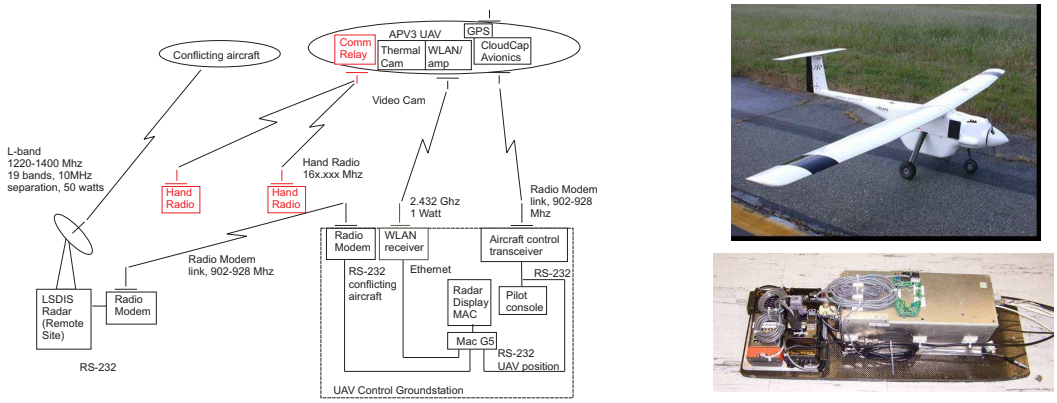

Figure 1 RSAC/NASA 2006 Small UAS Communications Mission Schematic, UAS, and Comms Payload

With regard to the operational coordination of DACA, the National Interagency Fire Center (NIFC)[13] serves as a focal point for coordinating the national mobilization of resources for wildland fire and other incidents throughout the United States. Once an incident goes beyond a local agency's ability to continue supplying resources, requests for additional resources are forwarded to one of eleven Geographic Area Coordination Centers (GACC) across the U.S. and Alaska. When the resource needs for an incident, or incidents, exceed the capability of the

[8] See http://www.conservationgateway.org/file/usfs-mtifam-mobile-strategies-recommendations
[9] See http://www.fs.fed.us/eng/rsac/ and http://www.fs.fed.us/eng/rsac/RS2006/presentations/zajkowski2.pdf
[10] See http://www.firesciencepartnership.org/index.html
[11] See http://www.wfmrda.nwcg.gov/
[12] See http://geo.arc.nasa.gov/sge/WRAP/partners/tfrsac.html
[13] See http://www.nifc.gov/index.html

GACC, resource orders are then forwarded to the NIFC's National Interagency Coordination Center (NICC). The NICC is an interagency operation that provides logistic support and intelligence reporting to all wildland management agencies. NICC dispatches crews, overhead personnel, aircraft, supplies, and services across the U.S. and Canada, and to other foreign countries based upon requests from the Office of Foreign Disaster Assistance of the U.S. Department of State.[14] Policies and procedures as practiced for communications and air operations are laid out well in advance of the fire season in documents such as the Redbook,[15] the National Incident Radio Support Cache User's Guide,[16] and others.[17]

The NIFC National Interagency Incident Command Division (NIICD)[18] provides portable emergency communications, technical training, and airborne remote sensing imagery services while optimizing resources and minimizing risks. NIICD's major focus is wildland fire suppression, but NIICD equipment and personnel have been utilized on hurricanes, floods, earthquakes, volcanic eruptions, oil spills, and other man-made and natural disasters where federal assistance is required. The NIICD Engineering and Development Section provides communications systems and remote sensing design and engineering support for the equipment requirements of interagency incident communications. The Section works both within the NIICD and in the field environment. Field work consists of field testing equipment and operational support for actual all-risk incidents. In addition, the British Columbia Ministry of Forestry and NIFC have developed fire repeaters that can be quickly deployed to temporarily enhance radio communications for fire fighters where area coverage is poor. These repeaters can be linked into existing networks, or work as stand alone units. Combined with an antenna and mast, an entire radio site can be quickly deployed by vehicle or helicopter to a hilltop to provide communications coverage during the response to a wildland fire or other types of incidents.

NIICD's engineering staff is currently part of the U.S. Department of the Interior's (DOI) government-wide Digital Narrowband Radio Contract Team. Activities to advance interoperable, interagency communications include serving as the national interagency wildland fire technical representative to DOI's contract committee and test team, and functioning as the federal wildland

[14] See http://www.nifc.gov/aboutNIFC/about_faq.html#fires%20managed
[15] See http://www.nifc.gov/PUBLICATIONS/redbook/2012/Chapter15.pdf
[16] See http://www.nifc.gov/NIICD/docs/NIRSC_UG.pdf
[17] See http://www.nifc.gov/NIICD/documents.html
[18] See http://www.nifc.gov/NIICD/index.html

fire and aviation's technical expert on APCO Project 25, EIA/TIA-102. The NIICD Engineering and Development Section performs the "Fire Radio Certification" testing for all of the federal wildland fire agencies. Each radio submitted under the DOI Digital Radio contract as a "fire radio" undergoes functionality and performance testing. This testing includes field tests to insure it will meet the extreme operational requirements of the wildland fire and aviation community. The NIICD Branch engineer is also a member of the TIA Land Mobile Radio Committee (TR8) for digital radios.

Summary

A key element of our response to the DACA NOI is captured in the comment in Paragraph 18 from AT&T that DACA technology should only be used as a last resort. Usage is one of the five essential elements for interoperable communications that is identified in the public safety interoperability continuum (See Figure 2). At the highest level of maturity, daily usage of governance, standard operating procedures, technology, and training ensures that interoperable communications will function during a crisis, when communications capabilities are under the greatest stress. In this context, the Continuum's elements, which are all subjects of the NOI, may be seen to hinge on usage.

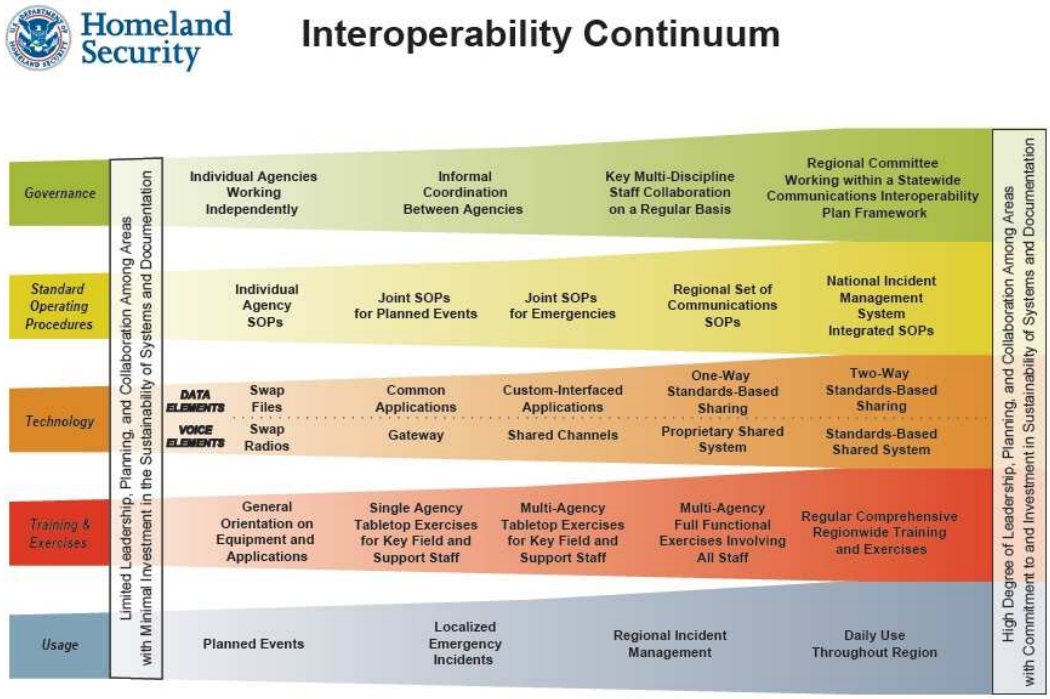

Figure 2 Public Safety Communications Interoperability Continuum

The DHS Office of Interoperable Communication's publication, Public Safety Statement of Requirements for Communications and Interoperability (SoR)[19] addresses usage by defining four communications operability and interoperability modes:

- Intra-agency operability
- Inter-agency interoperability, including
  - Day-to-day
  - Task force
  - Mutual aid operations.

The majority of public safety usage (as much as 90%) consists of intra-agency, and day-to-day inter-agency communications. In its general discussion of public safety operations, and in its focused discussion on structure and wildland fire suppression, the SoR recognizes that day-to-day intra- and inter-agency modes will include task force and mutual aid activities. However, in breaking out these modes separately, the SoR distinguishes them from the day-to-day mode to consider events of expanded scope and scale that are compounded by serious and dangerous situations such as shortages of equipment, personnel and water, greater uncertainty about the location and condition of victims, multiple fires, rescue operations, police actions, and overloaded communications and transportation resources. The SoR goes on to conclude:

> Communications systems must support day-to-day operations with all the same performance features that may be required to support the other modes of operation. Unless the systems provide the first responders with seamless functionality regardless of the mode of operation, the first responders will not use their systems efficiently or effectively, especially when they need to operate in the task force and mutual aid modes. [20]

The practice of wildland firefighting communications encompasses all the elements of the interoperability continuum. The continuum in turn encapsulates not only the questions raised in the DACA NOI, but the common vision that was developed in the SoR for establishing base-level communications and interoperability standards for the emergency response community. As such, UAPSA recommends that the FCC work with the wildland firefighting community to achieve day-to-day DACA usage. DACA has the potential to address current wildland firefighting requirements, and DACA usage for wildland firefighting can provide an important

[19] See http://www.safecomprogram.gov/library/lists/library/DispForm.aspx?ID=302
[20] *Public Safety Statement of Requirements for Communications and Interoperability*, p22.

testbed that will help align FCC research, development, test and evaluation efforts with critical, public safety operable and interoperable communication needs. By working with the wildland firefighting community, the FCC can ultimately realize the opportunity that DACA presents to restore area-wide communications after major disasters.